

made its appearance, and the circumstances attending its publication are, as the editor informs us, without precedent in the nineteen years during which this important and most valuable annual has been issued. The sudden death on the Niger of Mr. W. A. Forbes, the late recorder of the literature relating to the mammals, was soon followed by the loss of the help of Mr. Howard Saunders in the arduous work concerning the recording of the literature of the birds. These severe losses have been supplied by Mr. Oldfield Thomas and Mr. R. B. Sharpe. In the records of the fishes Mr. Boulenger has had the assistance of Mr. R. Ogilvie-Grant. Mr. Ridley has handed the recording of the Protozoa over to Mr. W. Saville Kent, and the Myriapod literature has fallen to Mr. I. D. Gibson-Carmichael. It thus happens that of the recorders who, just twenty years ago, assisted Dr. Günther in the arduous undertaking of bringing out the first volume of this work, but one, Dr. E. von Martens, still responds to the editor's call, though happily all of the first recorders still survive to overlook and appreciate the labours of their successors.

The editor apologises for some slight delay in the appearance of the volume, owing to the mechanical difficulties brought about by all these changes, difficulties only to be thoroughly understood by those who have experienced them, and which we trust will not trouble the editor again. It is not without interest to note that nearly two-thirds of this volume is compiled by officers of the Natural History Department of the British Museum; indeed, if we include Dr. E. von Martens' work, and remember that he occupies the position of assistant in the Natural History Museum of Berlin, it would appear that over 600 out of 700 pages have been compiled by writers whose lives are devoted to the subjects about which they write.

The editor has again to thank the British Association for the Advancement of Science and the Government Grant Committee of the Royal Society for kindly aid in assistance of the publication. The number of new genera and sub-genera recorded in this volume is 1015 as against 1438 in the last volume, and it will be remembered that this latter number included 483 new genera made by Haeckel.

Each recorder seems to have executed his share of the work well and painstakingly. The special treatment of the literature of each group is on the lines of that followed in the later volumes of the series. We warmly congratulate the Zoological Record Association on the result of their editor's labours.

Sketches of North-Western Mongolia. Vol. IV.—*Ethnographical Materials.* By G. N. Potanin. 1025 pages, with 26 Plates (Russian). (St. Petersburg: Published by the Russian Geographical Society.)

THE first two volumes of this important work contained the results of the journeys by the author in 1876 and 1877. The third, which is in print, will contain the geographical materials collected during the journey of 1879, and the volume we have before us deals with the ethnographical part of the same journey. It begins with an enumeration of the Turkish and Mongolian peoples who inhabit the region: Tartars, Uryankhays, Kirghiz, Durbuts, Darkhats, and Buryats, with the legends current about their origin. There is no general sketch of the populations dealt with; the aim of the author seems to have been to give in this volume a collection of materials, rather than to enter the field of general conclusions. With regard to the former, the present volume is a most valuable one. We find in it interesting facts as to the family, social, and religious life of the inhabitants; a list of names of stars, plants, and animals, together with the beliefs about them, and finally, their legends and folk-lore. Of these, no less than 200 are given, containing a rich and new source of infor-

mation. On almost every one of the 500 pages occupied by these legends and tales one is attracted either by their poetical beauty or by the light they throw on the mythology and popular conceptions of the inhabitants of this border region of Central Asia; while M. Potanin's name is the best warrant for the accuracy of the transcription of the legends reported. However rich this material, one hesitates to say which of the two is more valuable, the folk-lore published, or the annotations which follow them. These last cover 300 pages of small type, and we find there, philological explanations, comparisons with the legends of other Finnish tribes, most valuable materials for comparative mythology, and so on, all being the result of a thorough study of nearly the whole of the Russian literature of the subject, disseminated through periodicals of the most various descriptions. While perusing these invaluable materials one only regrets that the author has not yet been brought to summarise his wide studies and to draw therefrom some conclusions which may enter into the domain of science. In any case a careful index of all matter mentioned in the volume would much facilitate the researches. The plates represent mostly the pictured tambourines of the shamans and the *ongons* (holy pictures and idols) of the Tartars, Uryankhays, and Buryats.

P. K.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

Quintino Sella

IT is proposed to place a bronze wreath on the tomb of the distinguished Italian geologist and statesman, Quintino Sella. English geologists are invited to express their sympathy with their Italian fellow-workers by sending in their names with a small subscription. I have been requested to bring the matter before their notice, and to collect the subscriptions in this country.

THOS. M'KENNY HUGHES

Woodwardian Museum, Cambridge, March 25

Electrostatic Measurement of E.M.F.

PERHAPS you will allow me to make known through your columns to those who have from time to time made inquiries concerning my Absolute Sine Electrometer, that, after many months' work, I have satisfactorily concluded a series of experiments with the instrument which was made for Prof. Anthony. When this instrument was finished last year, I made some observations with it which were so unsatisfactory that I did not feel justified in allowing it to be sent to America. I have now, however, removed all the difficulties connected with it, and I uniformly obtain results perfectly consistent one with another. Indeed my difficulties during the last six weeks were due to the fact of my employing cells which were not sufficiently constant, and not to any fault of the electrometer, a fact which I did not realise for some time.

I hope to publish in a few days a full report on the various points connected with the instrument and on the experimental results obtained.

GEORGE M. MINCHIN

Royal Indian Engineering College, Cooper's Hill, March 24

Pons' Comet

THIS comet has been visible here some time. I first saw it at 9 p.m. on January 15, but only for two or three minutes, through the clouds. On the following evening (January 16) I saw it well. To the naked eye it looked like a star of the first magnitude seen through a haze; the tail was visible, but not at all conspicuous. In the telescope (4-inch) the head was large, but

appeared wholly nebulous, with a bright central condensation; the tail broad, but faint. I could only trace it some 2" or 3". The brightness of the nucleus must have been considerable, as when close to the horizon I could see it through a pretty thick cloud. Subsequently the nucleus has seemed to me decidedly more disk-like, I suppose from being better seen. I may add that the sunset-glows and the unusually cloudy weather we are having have interfered greatly with satisfactory observation.

Nelson, N.Z., February 1

A. S. ATKINSON

The Access to Mountains and Moorlands Bill

I AM glad to observe that you have called the attention of scientific men to the importance of Mr. Bryce's Bill. Perhaps nothing can better show the need of such a measure than certain facts in regard to the Clova district in Forfarshire, which is classic ground to the botanist; indeed, I think I may venture to say that it is the richest ground in the British Islands. From time immemorial a right of way existed through Glen Dale, and, I can remember the time when botanists could ascend any of the hills in that district without being subjected to the tender, though somewhat embarrassing attention of gamekeepers. I have good reason to believe that the case is somewhat altered in recent years, and that, after a man has gone hundreds of miles in order to see *Oxytropis campestris* growing in its only British station, he may find himself turned back just within sight of the goal. The thing can still be done by taking advantage of a curious fact in natural history, viz. that two gamekeepers cannot remain long in loving converse with three men: by keeping this fact in mind, one out of three may still study the botany of Clova. After having gone pretty well over Scotland I am glad to say that there are many places in which there is no need for Mr. Bryce's Bill. In most cases in which it is needed it is where "new men" usurp a power which the old lords of the soil never dreamt they possessed.

Edinburgh, March 24

A. CRAIG-CHRISTIE

A Sixth Sense

IN the valuable address given by Sir William Thomson at the Midland Institute, Birmingham, on October 3, and reported so fully in the columns of NATURE, it is implied that Dr. Thomas Reid of Glasgow brought out the distinction of a sixth or muscular sense. I cannot find any satisfactory evidence of this, although Reid came very near it indeed when he stated in his "Inquiry into the Human Mind," chap. v. section 1:—"By touch we perceive not one quality only, but many, and those of very different kinds;" and again:—"There is, no doubt, a sensation by which we perceive a body to be hard or soft;" and again, further on he even speaks of its being strange that this sense should "be so much unknown as never to have been made an object of thought or reflection nor to have been honoured with a name in any language."

And on the other hand, while I cannot detect any attempt whatever to refer this sensation to the muscles as its peripheral origin, while speaking of our conception of the hardness of bodies, Dr. Reid says (p. 121, ed. of 1846):—"We have no way of coming at this conception and belief, but by means of a certain sensation of touch;" and again, "I see nothing left but to conclude that, by an original principle of our constitution, a certain sensation of touch both suggests to the mind the conception of hardness and creates a belief of it." Reid, in short, like his eminent predecessor Hutcheson in the same chair, was dissatisfied with the ordinary division of the senses, and really felt disposed to split up the varied phenomena bundled up under the term "touch" into two or more divisions; but it was reserved for Dr. Thomas Brown, a good physiologist according to the light of the times, and Professor of Moral Philosophy in Edinburgh (1810-20), explicitly to complete the distinction hinted at by Reid, and to refer our conception of resistance or tension (as we find in estimating weights by the hand) to a distinct sixth or muscular sense. Thus in his twenty-second lecture he says:—"The feeling of resistance is, I conceive, to be ascribed, not to an organ of touch, but to our muscular frame, to which I have already more than once directed your attention, as forming a distinct organ of sense." In the lecture which follows that, Brown admits the frequent mingling of mere tactual sensation with that of muscular effort:—"But it is not of this mere tactual feeling we think when we term bodies hard or soft—it is of the greater or less resistance which they afford to our muscular contraction."

It is remarkable that the teaching of this eminent psychologist, the preceptor of James Mill, should so early have been forgotten in Scotland.

HENRY FAULDS

Laurel Bank, Shawlands, Glasgow, March 18

MR. FAULDS, in the preceding letter, is no doubt quite correct in remarking that the distinction pointed out and insisted on (not merely hinted at) by Thomas Reid, a little more than a hundred years ago, in the Moral Philosophy Chair of the University of Glasgow, was more clearly and fully defined by his eminent successor in Edinburgh, Thomas Brown. But I cannot agree with his last sentence, implying that Thomas Brown is forgotten in Scotland. In fact, my mind was so full of Reid and Brown, from my recollections of the teachings of the Professors of Moral Philosophy and Logic in this University, that, in giving my address at Birmingham, I said Thomas Brown, meaning Thomas Reid, but feeling the names of Reid and Brown both thoroughly mixed up with all I had ever learned of this subject.

WILLIAM THOMSON

The University, Glasgow, March 20

Earthworms

THE theory of the formation of vegetable mould through the action of earthworms, by Darwin, received little attention when published from people who had been accustomed to examine the soils of various countries. That the vegetable soil had been formed as he states seemed to have been accepted by his followers without hesitation. In your columns, however, of late, letters have appeared from Messrs. R. M. Christy and T. E. Wilcox, showing that earthworms do not exist in the prairies in the north-west of Canada or in the United States, in those of Kansas, the Indian Territory, or in Idaho and Washington Territory. This is simply what may be expected. Notwithstanding the keenness of observation of Darwin and his width of observation, there seem vast regions where earthworms have had little to do with the formation of the vegetable soil. In many parts of Australia, and also in the moister climate of New Zealand, the soil affords few indications that earthworms ever passed it through their bodies. In a section of soil I brought from the Matura plain, South Island of New Zealand, nothing could be seen to indicate that worms had ever swallowed it. That vegetable soil forms a fit habitation for earthworms is undoubted. Darwin admits "that a layer, though a thin one, of fine earth, which probably long retains some moisture, is in all cases necessary for their existence." Before this thin layer existed, how could they—the worms—form vegetable soil? This thin layer must have been formed in some other way; Darwin does not say how. It is not necessary to call in the aid of earthworms to do so. The very name which has been universally applied to the thin upper covering, the exterior film enveloping the surface of the deposits underneath, viz. vegetable soil, speaks to its origin in the decay of vegetation. Take for instance the boulder-clays of this part of the Lothians in Scotland, with their tough, stony texture, their pebbles as finely striated as when the ice squeezed them into the pasty mass of crushed shales out of which they appear to have been partly formed. While these surfaces could have afforded none of the conditions required by Darwin, or indeed supply any other save inorganic food, the slow growth on their surfaces of the more simple forms of vegetable life, and their decay, would in the lapse of ages supply the thin film which Darwin requires. It surely, then, is attempting too much to ascribe to the earthworm the formation of the vegetable soil. The earthworm is not the only occupant of the material which the growth and decay of vegetation supplies as a surface covering. The earthworm is not the only drainer. The roots of many plants not only descend deeply into the subsoils, but also fetch up from depths where worms could not reach supplies of material to mix with the superficial covering; and so do the various insects which have their habitat in the soil, burrowing as they go, and casting, like the mole, the stuff behind them or upwards as they descend.

So far as I have examined soils, I am inclined to think that the earthworm is far more plentiful when animal matter in a decaying state is applied to soils near the dwellings of man, or when his deposits are laid over those of the larger animals. As against the views of Hutton and Playfair, and as stated by Darwin, that the vegetable soil or mould is always diminishing, I have to say it seems entirely the reverse; it seems to have had a be-